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Biogeosciences Discussions

Interactive comment on "Interpretation of benthic foraminiferal stable isotopes in subtidal estuarine environments" *by* P. Diz et al.

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This is overall a very good paper with novel and interesting data and I strongly support publication. The things I have to say are in part remarks, in part questions where things are not clear to me.

Abstract The paper defines the studied environments as 'subtidal estuarine'. I would like to have an indication of water depths at the study sites (water depth below mean tide or some other tidal reference datum). Maybe I overlooked it, but I do not seem to have found any indication of how far below tide level, and whether the benthic foraminifera live within the photic zone or not. How about the bottom- any living sub-aquatic vegetation?

7455 line 8: please insert 'at mid to high latitudes' – temperature variability is of course much less in the tropics.

7456 lines 14-15: why are sediments in areas affected by tidal currents enriched in fine fraction and organic matter? Are the currents bringing it in and dropping it during the tchange in tides, or are they too weak to winnow that material? Is there evidence of sand motion (ripples?) in the sandy areas?

7458: are the plants remains from terrestrial vegetation or from water plants?

Section 3.2.2: can you indicate at which depth most living forams were present? It would be good to know whether calcification occurred at sediment water interface or infaunally. And some short notes of what other species (if any) are present? Reference to publication on faunas from the region? Are these the publications given in section 4.3?

7460, lines 1 and 14: in the first salinity ranges are between 18-36 in lower through upper estuary, in the latter the range is given as 30-32.

7460 line 15: Indeed, the figure shows a linear relationship with salinity for both carbon and oxygen isotopes. What I do not understand is WHY this relation is linear for carbon isotopes. Oxygen isotopes in mixtures fresh and salt water obviously show a linear relations ship, but the relationship between the carbon isotope in dissolved inorganic carbon are linear ONLY if the concentrations of DIC in the fresh and salt water end member are exactly the same – otherwise you get a curve (see our figure in Thomas et al 2000). Are these concentrations the same? Otherwise why the straight line? Or could a curve also be fitted? The oxygen isotope values for rain (about minus 5 per mille surprises me somewhat – we get about –10 in Connecticut and you are about 10 degrees further north so I'd expect from the MWL that you would be more negative than we are.

7461 line 16: please spell out what 'some differences' are – referring to the two species

under study or abundance of other species?

Section 4.4 and on: I suppose that is a very silly question, but if you use the averaged annual temperature measured and the averaged annual salinity, what would you predict for the calcite values if precipitated in equilibrium? Just for a baseline.

7462 line 16-17: gradient in salinity should have been stepper in winter. – you could argue that you indeed see this in the carbon isotopes, confirming your use of these as salinity proxy.

Section 5.1: I really like these plots – but they are a bit small and do not enlarge very well. Is that just my browser or can that be changed?

7465: I am sure that you are also surprised with the implications that the forams live for extended periods after stopping to calcify (thus to grow) and without reproduction. The data look like that, I agree, but it's rather amazing. Why would they do that? Do they somehow not get enough energy to reproduce or grow? How large were the analyzed specimens? Were they old or young? It is especially surprising that A tepida calcified in the summer than just sat there living on; I think that it was Bradshaw (and also Schnitker) who argued that they reproduce only when temperatures are above $\sim$20oC for a few weeks on end, so that would limit reproduction pretty much to full summer – so your specimens must have missed out on the reproductive period somehow. Your values are of course an average over 6-10 individuals. Would it be possible that these averages actually represent an average of specimens that calcified are different times? Any chance that you can get single specimen data? Lines 26-27: they can in the lab, that does not surprise me, but it does surprise me that they do it in nature.

7466 line 1: what would be the ideal habitat for these species/ deeper water? Less variability?

7466 lines 17-24: what several reasons? I do not quite follow the argument on the oxygen isotope data.

7467 line 12-13: I do not quite follow the sentence 'that the strong seasonality needs additional constraints from independent proxies' – this cannot be what you mean, since seasonality cannot be constrained by humans . You mean that we need to evaluate the effect of seasonality on observed proxies?

7467: line 10: you are right, of course, although if one studies core samples of a few cm thickness one gets of course a very much averaged signature which is not directly comparable with data on specimens living at the same short period of time. In general, we get about the temperature of the average of the warmest 7-8 months of the year (from Mg/Ca data). Might be fun to look at Mg/Ca in the forams for comparison with the isotope data. Figure 3: is it possible to plot the range of oxygen isotope data (converted to SMOW) as well?

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